

In the drawings:

Please replace Figure 3 (A) with the Replacement Sheet enclosed with this amendment and response.

Remarks

In view of the foregoing amendments to the ***Specification*** and the ***Claims***, and the following ***Remarks***, a reconsideration of the instant application is respectfully requested.

General remarks

The present invention is a high-strength impact resistant composite laminate comprising **three structurally distinct parts** being created by at least **five separate layers**:

- 1) two outer layers;
- 2) at least two inner plies; and
- 3) at least one dissipating element.

As can be understood from the amended ***Specification*** description and amended Claim 61, the inherent characteristics of the composite laminate of the invention is due to the **superposition of at least five distinct layers** which are further combined by a polymer matrix. The Applicant's invention in its basic form and as described in Claim 61 is a *symmetrical structure*, without having different 'face' and 'back' sides of the structure. The impact can come from either the 'face' or 'back' side of the laminate, and the impact resistance is achieved through the existence, and separate functions, of the three structural parts (five layers) of the composite structure.

The number of inner plies and dissipating elements layers depends on the product requirements in terms of strength, impact resistance, and thickness. The new drawing, **Figure 3(A)**, provides a schematic presentation of the multi-layered composite structure based on the Respondent's invention. Namely, **Figure 3(A)** shows more than one set of inner plies and more than one dissipating element between the said inner plies, as claimed

in Claim 62. The dissipating elements used in the composite laminate of the Applicant's invention form a net of triangular/multiangular force equilibriums and act in a way to redirect outer force/loading from transversal to longitudinal components in the structure.

In view of the above, it is submitted that **none** of the cited prior arts, in isolation or in combination, as presented by either Neal, Bjorksten, Holis, Cook or Calfee, **teaches** a laminate structure as disclosed in amended Claim 61, and dependant Claims 62 – 73, of the Applicant's invention.

Therefore it is respectfully submitted that the Applicant's invention is **novel** and contains an **innovative step** and is **non-obvious** in view of the cited prior art, and as such is in condition for allowance.

Detailed arguments are presented on the following pages.

RESPONSE TO DETAILED ACTION (NB: the numbers correspond to the Office Action's numbering of issues, for ease of following)

Drawings – 37 CFR 1.83(a)

1. ***Office Action, Page 2: “The drawings are objected to under 37 CFR 1.83(a). It is objected that the drawings ‘must show every feature of the invention specified in the claims’.”***

The Applicant respectfully acknowledges the objection and submits a NEW drawing, **Figure 3(A)**, which shows multiple layers of INNER PLIES and multiple layers of DISSIPATING ELEMENTS, between the two OUTER LAYERS, as per Claim 62.

The Applicant thanks the Examiner for bringing this to the Applicant's attention.

No new matter has been entered.

Claim Rejections – 35 USC § 112

2. ***Office Action, page 3: “Claim 61 – 73 rejected under 35 USC 112, first paragraph, as failing to comply with the written description requirement.”***

It is considered that this objection relates to two separate, but related, issues:

THE FIRST ISSUE relates to the text of the ***Specification***, namely to the following words in the Specification:

10 The outer plies (2) are constructed from a variety of dry or pre-impregnated (prepregs)
reinforcement materials such as but not limited to: Glass, Aramid, Carbon, Quartz,
Borron, Basalt, Polyurethane, natural, non-natural, and any other single or hybrid
fibres, in combination with variety of any known thermosetting and thermoplastic
matrixes (3) such, but not limited to: Vinylester, Epoxy, Phenolic, Polypropylene
Nylon, Polyester, Amino, Bismaleimides, Polyether, Silicones, Cyanatesters,
15 Polybutadine, Polyetheramide, Polyimides, fire retardant, corrosion resistant, any
sort of adhesives, coatings, pigments, sealants, catalysts, accelerators, diluents, etc.

It is, firstly and with thanks, noted and acknowledged that the cited part of the
Specification contains a **typographical error**, on page 3 line 9 (shown in the excerpt
above), in that it states that ‘The outer plies (2) are constructed from a variety of dry or
pre-impregnated (prepregs) reinforcement materials...’.

It is with respect submitted that the word ‘outer’ in the said line 9 should read
‘**inner**’, namely: “The inner plies (2)...’. This is consistent with the description in the
first clause on page 2, line 22 to 25, under the heading Detailed Description of a
Preferred Embodiment, where the inner plies are defined as being marked with the
number ‘(2)’. It is also pointed out that all the Drawings, namely Figures (1) – (3) , and
the new **Figure 3(A)** consistently show that the ‘*inner plies*’ are marked with the number
(2) and were part of the originally submitted patent application.

The *Specification* has now been amended to respond to these objections.

THE SECOND ISSUE relates to the objection of ‘negative limitation’: It is, with thanks
and respect, acknowledged that a previous amendment to Claim 61, namely the
introduction of the ‘negative limitation’, has now been revoked, in light of the

Examiner's rejection of such amended Claim 61. Claim 61, as it now reads, is discussed in light of the objection dated 12 November 2008, in respect of **Neal US 6,703,104 B1**.

Claim 61 has now been amended to respond to these objections.

The Examiner is referred to a complete argument on this matter presented in this paper, on pages 29-32.

3. Office Action, page 4: “Claim 61-73 rejected under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.”

The next part of the objection, namely at **Office Action, page 4**, stated: ***“It is not clear if the inner plies are equated with outer plies shown in the figures.”***

It is respectfully submitted that the above amendment of the **Specification** removes any confusion as to the existence of *at least* five separate structural layers in the present invention: at least two outer layers (4), at least two inner plies (2), and at least one dissipating element (1), with two inner plies laid between the two outer layers and the dissipating element laid between the two inner plies, and space in between these five layers being filled with resin (3), as per Claim 61.

Clarification is also achieved by the deletion of the third correction, which relates to the use of the word ‘optional’ in the **Specification**. It is, with the aim of clarifying and firming up the consistency of the description of the claimed structure with the Claims, submitted that the **Specification** be amended to omit the word ‘optional’ as it inconsistently appears in relation to the outer layers, thereby strengthening an inherent limitation already existent in the Claims, namely that two *outer layers* are part of any

Respondent's laminate structure – as per Claim 61 and all dependant Claims (62-73).

This removes any potential uncertainty that may have been existed in the *Specification* by the use of the word 'optional'.

It is, as a result, understood that it has been sufficiently clarified that the *inner plies* are **NOT** equated with *outer layers* in the Applicant's invention.

Now that the typographical error has been corrected in the *Specification*, the distinction between the *outer layers* (4) and *inner plies* (2) in the present invention is clearly made out, resulting in Claim 61 and Claims 62 – 73 being fully consistent with the description in the corrected *Specification*.

It is submitted that this amendment to the *Specification* overcomes the outlined inconsistency with the requirement of 35 USC 112 paragraph 1 and satisfies the requirement of 35 USC 112 paragraph 2.

The Applicant's Claims 61-73 now meet the threshold requirement of clarity and precision, as required by 35 USC 112, second paragraph.

No new matter has been introduced.

ANTICIPATION: BJORKSTEN et al

4. Office Action, pages 4 and 5: "Claim 61 rejected under 35 USC 102(b) as being anticipated by Bjorksten et al (US 2,768,919)"

It is submitted that there are substantive differences between the Applicant's and Bjorksten's inventions and that the Applicant's invention had not been 'anticipated by

Bjorksten et al.’ It is respectfully observed that the purpose of Bjorksten’s invention is to protect against ‘*relatively slow, non-ballistic impact.*’ This is essentially a different purpose from the Applicant’s invention, which is a “high impact strength, elastic laminate system”. The following differences underline further distinctions.

The Applicant teaches at least **five distinct layers** in his invention (see *General Comments* above). Bjorksten does not teach the minimum of five separate layers. Specifically, Bjorksten does not teach separate ‘*inner plies*’ in the meaning and to the effect they are taught in the Applicant’s invention.

POINT OF NOTE:

Firstly, may it be respectfully pointed out that the **Examiner calls** Bjorksten’s layers, marked (2), (3) and (10), all ‘inner layers’. If (2) and (3) are indeed ‘inner layers’, then (10) cannot be an ‘inner layer’ at the same time, as it is (when included – see discussion below) a completely different part of the structure. As it is not clear on which basis the Examiner interchangeably uses the term ‘inner layers’ for Bjorksten’s ‘inner layers’ (2) and (3), AND the ‘inner layer’ (10), it is submitted that this is an error in Examiner’s reading of Bjorksten’s Figure 1.

Secondly, there also seems to be a further error in the Examiner’s interpretation of the said Bjorksten’s Figure 1, as the Examiner calls the element marked with number (4) both the ‘outer layers’ and ‘dissipating elements’ (middle of page 5 of the Office Action). The Applicant asserts that layer (4) is an *outer layer* as taught by Bjorksten. It is not clear how layer (4) could at the same time be an ‘outer

layer’ AND a ‘dissipating element’. It is submitted that these equations made by the Examiner describing the prior art are made in error.

Therefore, the correct numbering and naming of layers according to Bjorksten’s Figure 1 is asserted to be:

- = Outer layers (1) and (4) – being “smooth and flexible, and which may consist, for example, of a thin sheet of resilient plastic material, or of about 3-5mil metal foil” (Column 1, lines 47-49);
- = Inner layers (2), (3) and (5) – being “composed of a large number of small spherical calottes” (Column 1, lines 50-51), and
- = ‘A smooth resilient layer (10)’ – which “**may be** positioned between the layer of calottes, to support the outer layer more evenly, though this layer is **not necessary** for the invention” (Column 1, lines 57-61)

ARGUMENTS:

The Applicant submits that a distinction in function between Bjorksten’s layers is not established or anticipated in the same way as the distinction between the functions **of each of the three sets of structural layers comprising of at least five layers** in the present invention. The purpose of having separate ‘outer layers’, ‘inner / reinforcement plies’ **and** a ‘dissipating element’ in the present invention is to control the strength of the structure (inner plies), initial receiving of the randomly applied load (outer layers) and dissipation and redirection of the loading / energy (dissipating element).

These differences are demonstrated through the following:

Difference 1: DISSIPATING ELEMENT - Figure 1 of Bjorksten reference does

not disclose a ‘dissipating element’ **between** the ‘inner plies’ which are located **between** the ‘first and second outer layers’ in the way it is taught by the Applicant.

- ⊖ Bjorksten’s layer (10) cannot be equated with the Applicant’s ‘**dissipating element**’. To suggest this equation is an error. Bjorksten teaches that layer (10) only ‘**may be**’ (Column 1 lines 57-61) positioned between the ‘layer (sic) of calottes’.
- ⊖ The use of the words ‘**may be**’ is essential here, as it clearly demonstrates that the layer marked (10) is NOT playing a role of a ‘dissipating element’ as taught by the Applicant, namely ‘*adapted to dissipate and redirect randomly directed local loading to at least one of the said two outer layers, to tensile loading directed in a longitudinal direction (tensile) of said at least two inner plies*’.
- ⊖ Emphasis is put on the word ‘**may**’, since Bjorksten does not disclose the use of at least **two inner plies** placed between the **first and second outer layers** in combination with at least **one dissipating** element between the said inner plies, as described in Claim 61 of the Applicant’s invention.
- ⊖ Bjorksten therefore differs as he does not teach that layer (10), when included in the structure, plays the essential function of the Applicant’s dissipating element (1), being that it ‘**dissipates and redirects**’ load that is applied to at least one of the ‘outer layers’ and in longitudinal (tensile) direction of the said ‘reinforcement inner plies’ (2).
- ⊖ The Applicant respectfully supports his arguments with the following reference:
“The fact that a certain result or characteristic may occur or be present in the prior

art is not sufficient to establish the inherency of that result or characteristic”: as in *re Rijckaert*, 9 F.3d 1531,1534,28 USPQ2d 1955,1957 (Fed.Cir.1993), see MPEP §2112(IV).

Difference 2: INNER PLIES – Bjorksten, furthermore, does not teach or suggest his ‘inner layers’ to be ‘**reinforcement plies**’ as taught by the Applicant.

- The Applicant’s ‘inner plies’ are *reinforcement plies*, which ‘redistribute a component of the outer loading in a longitudinal direction to [their] main axis’.
- The ‘inner plies’, as taught in the present invention, cannot be discarded without changing the functionality of the resultant laminate structure of the present invention. Inner plies serve the purpose of reinforcing the structure, which is different from the roles of *both* the ‘outer layers’ *and* the ‘dissipating element’.
- Bjorksten, furthermore, does not teach *multiple* layers of reinforcement plies, as per the Applicant’s teaching - i.e., Claim 61 teaches ‘*at least two inner plies...*’ and Claim 62 teaches ‘*additional layers of said first and second plies*’.

Difference 3 – MATRIX - As to the Examiner’s equation of Bjorksten’s ‘adhesive’ (in the last paragraph on page 5 of Office Action) with the Applicant’s ‘**polymer matrix**’ [number (3) in Applicant’s *Drawings*], it is submitted that the polymer matrix in Applicant’s Claim 61, as now amended and presented in this paper, is **not absent** between sections “such as within calottes” (sic) and is another point of difference with the Applicant’s invention.

Therefore, as Bjorksten makes no disclosure, reference, teaching or suggestion of a ‘*dissipating element*’ or the use of ‘*redirecting load*’, nor he teaches ‘inner plies’ as ‘*reinforcement plies*’, it can be appreciated that the description in Applicant’s Claim 61 of at least two inner reinforcement plies placed between the first and second outer layers, in combination with at least one dissipating element between the said inner plies is structurally and functionally different to, and is not anticipated by, Bjorksten’s invention.

Furthermore, it is well settled that subject matter is inherent only when extrinsic evidence makes it clear that the subject matter necessarily (i.e. inevitably) flows from a disclosure of cited art. (*MPEP* 2112). This requirement is a prerequisite to invoking the doctrine of inherency and cannot be avoided. Consequently, inherency may never be established by mere probabilities or even possibilities and the mere fact that a certain thing **may be** present (or may result) is always insufficient. (*MPEP* 2112).

It follows that Bjorksten’s teaching is substantially different to Applicant’s and it is respectfully concluded and proven that the descriptions in Claim 61 are **not** inherently found in Bjorksten reference and are **not anticipated** by him.

The rejection based on the Bjorksten reference is not believed to be a proper 35 USC 102(b) rejection. The applicant requests that the Examiner reconsiders her rejections of the invention in view not only of the abovementioned arguments, but also in view of the well established principle that ‘small differences in a crowded art can constitute patentable improvement’. See in *Re Baum*, 51 USPQ 470 (CCPA 1941) and in *re Lange* , 126 USPQ 365 (CCPA 1960).

Additionally, the principle of inherency is a question of fact and an inherent property used in an anticipation rejection has to flow naturally from what is taught in a reference: see *Stoller v Ford Motor Co.*, 1991 US App. LEXIS 1084; 18 USPQ 2d (BNA) 1545.

It is therefore believed that the Examiner's rejection of the Applicant's Claim 61 as being anticipated by Bjorksten is an error and that Claim 61, as amended and presented in this paper, is in condition for allowance.

No new matter has been entered.

OBVIOUSNESS – BJORKSTEN, COOK, HOLLIS Sr

Office Action, page 5: "Claim Rejections – 35 USC § 103"

- 5. Office Action, page 6: "*Claim 61(sic) – 73 rejected under 35 USC 103(a) as being unpatentable over Bjorksten et al (US 2,768,919) in view of Cook et al (US 4,179,979) and Hollis, Sr. (US 4,179,979)*"**

It is recognised that this objection relates to patentability under the '***obviousness***' requirement of 35 USC 103(a).

The Applicant respectfully wishes to address each of the objections as presented in the Office Action under 103(a), in order to establish conclusively the clarity, originality, novelty, **non-obviousness** and ultimately **patentability** of his invention, as follows:

GENERAL - None of the cited prior arts teach specific, strictly defined functions of separate layers as per the present invention.

In KSR INT’L CO. v. TELEFLEX INC. 550 U. S. ____ (2007) [KSR Opinion] the Supreme Court stated that “[i]nventions usually rely upon building blocks long since uncovered, and claimed discoveries almost necessarily will be combinations of what, in some sense, is already known.” It is respectfully submitted that the Applicant’s invention brings with it a level of novelty not anticipated by or ‘obvious’ in the cited previous art of Cooke and Hollis Sr.

The rejection is respectfully traversed because the comparison between the structure described by Cook and Hollis Sr, and the claimed structure as per the Applicant’s Claim 61 is not appropriate, as per below:

COOK et al (US 4,179,979) –

- :- DIFFERENCE – STRUCTURE OF THE INVENTION:** On page 6 of the Office Action, the Examiner states that *“Cook teaches a multiply ballistic armor system comprised of layers of hard geometric objects tensionally restrained in their layers by fiber material interwoven about the objects...(page 7). Each layer of geometric objects is equated with a ply layer. Cook teaches multiply inner plies.”*
- :-** The Applicant wishes to make the point that the equation of the ‘hard geometric objects’ in Cook with the Applicant’s ‘inner plies’ is an error.

- ⊖ The present invention discloses a structure with three separate functional elements which comprise at least five layers – see the comprehensive discussion on this above.
- ⊖ It is submitted that Cook does not teach three *functionally distinct* elements, with their distinct roles and specific functions, as per the present invention.
- ⊖ None of Cook’s claims (Columns 7 and 8) teach **three** separate structural elements resulting in **at least five layers** (plus resin) of the present invention with distinct and specific functions. See the detailed discussion on the Applicant’s structure in this paper (above), which is relevant here.
- ⊖ In support of this aspect of the Applicant’s discussion, see *Re Robertson* , 169 F3d 743,745,49 USPQ2d 1949,1950-51 (Fed.Cir.1999), wherein the courts ruled that where a claimed invention had *three* separate elements and the prior art reference had *two* elements, the reference was not considered to disclose a separate third element, either expressly or inherently.
- ⊖ Cook does not teach **two outer layers** either of which can receive the ‘randomly directed local loading’ as per the present Claim 61. See the detailed discussion on the Applicant’s structure in this paper (above), which is relevant here.
- ⊖ The present invention presents at least five separate layers: two outer layers, at least two inner plies and at least one dissipating element. Each of these layers have their specific functions, as described in amended Claim 61: “...*at least one dissipating element between said inner plies adapted to dissipate and redirect randomly directed local loading applied to at least one of said two outer layers,*

*to tensile loading directed in longitudinal direction (tensile) of said inner plies;
...”.*

- ⊖ None of Cooke claims disclose, teach or suggest that at *least one* **dissipating element** redirects and dissipates the said loading in tensile direction of the **inner plies**. To conclude such teaching from Cook’s reference is an error: the mere fact that a certain thing *may* result from a given set of circumstances is not sufficient – see in *Re Runion*, 1993 US App.
- ⊖ As such, the present invention is **not** obvious in light of Cooke.

HOLLIS Sr (US 3,969,563)* *please respectfully note that the Office Action paper, page 6, makes a mistake in the Hollis Sr US patent number, which is here corrected)*

- ⊖ It is stated on page 7 of the Office Action, that Hollis teaches a ‘protective wall structure’ with two separate elements, plus the ‘polymer’. It **does not** teach at least five layers (two outer layers + two inner plies + one dissipating element), as per the present invention [for comprehensive discussion refer above].
- ⊖ Hollis does **not** teach ‘inner plies’ with the function of providing the structure with ‘*reinforcement*’. All the considerations presented already under the Bjorksten and Cook discussions in this paper apply.
- ⊖ Hollis teaches ‘*inner and outer wall coverings and positioned therebetween*’ [Abstract]. It is obvious from the careful reading of the entire Hollis patent documentation that the terms ‘inner’ and ‘outer’ do **not** refer to structural parts of the invention as per the present invention, **but** refer to inner and outer *side* of the structure as a whole – i.e. the ‘front’ (the ‘face’) and the ‘back’ *side* of the

structure viewed as a whole. In light of the discussion on the functions of the Applicant's separate layers in this paper, the *obviousness* argument based on Hollis must be rejected.

- Hollis also specifies in his Claim 1 that '*said rigidifying means being positioned between and contacting said wall elements*'. It is taught that the 'rigidifying means' touch the *inside of the* 'front' (outer) side of the structure **and also** touch the *inside of the* 'back' (inner) side of the structure, i.e. it is sandwiched in between the outer and inner **sides** of the structure (wall). This teaching is different from the Applicant's 'dissipating element' being positioned **between** the two 'inner plies' and the said inner plies being positioned **between** the 'two outer layers'.
- The elements in combination as per the present invention do not merely perform the function that each element performs separately, resulting in a synergism in the Applicant's invention, which is not known to Hollis.
- It is FURTHERMORE submitted that the Examiner's conclusion on the bottom of page 7 that "it would have been obvious to one of ordinary skill in the art at the time of the invention was made to add additional inner plies motivated to improve the strength and dissipation of an impact on the structural laminate" is **made in error** as it does not explain - *Graham v John Deere Co*, 383 US 1, 148 USPQ 459 (1966) refers -
 - o how it is concluded that '*one of ordinary skill in the art*' could have added '*additional inner plies motivated to improve the strength and*

dissipation’ and that the results of the addition to have been predictable and obvious;

- where the motivation would come from - it is submitted that in Hollis structure there is **no** motivation for the introduction of a third, completely **new** layer with a function of being ‘reinforcement plies’. Instead, there would more likely be motivation to include additional outer layers to increase *rigidity* (Hollis’ Claim 1), rather than the walls’ *elasticity*, as in the present invention.
- ⊖ The above is supported by the consideration that there are numerous variations of the Hollis structure and drawings, none of which claim a set of ‘*inner plies*’. The idea underpinning Hollis invention was to ensure *rigidity* of the wall structure, and not ‘*elasticity*’ and ‘*tensile strength*’, which are two different and distinct outcomes from ‘*rigidity*’. In this way, Hollis **teaches away** from the improvement of elasticity and strength, which is achieved by the Applicant by creating a structure with the said at least five distinct layers, and, in particular, by introducing the reinforcing *inner plies*. Therefore it is submitted that ‘*one of ordinary skill in the art*’ would **not** be motivated to seek the introduction of ‘inner reinforcement’ in the prior art through introducing two sets of reinforcing plies to increase the wall’s *tensile strength* and *elasticity*, which is the key feature of the present invention, as different from *rigidity* in Hollis’ art.
- ⊖ Even if they wished to do so, the nature of the problem that Hollis seeks to solve is different from the Applicant’s invention in that the Hollis invention

focuses on achieving *rigidity* of the wall structure and the Applicant's invention provides *tensile strength* and *elasticity*. To equate these two different functions in the prior art and present invention would be a mistake as it would *modify* the two distinct conceptual ideas underlying the two inventions. Therefore, the present invention is non-obvious in light of the cited prior art and rejection should be reversed.

6. Office Action, page 9: “Claim 61 – 73 rejected under 35 USC 103(a) as being unpatentable over Calfee (US 3,755,059) in view of Hollis, Sr. (US 4,179,979)”

The Applicant submits that there are a number of differences between his *Claims* and present invention and US 3,755,059 (Calfee).

The Examiner refers to four layers in Calfee. However, Calfee (Claim 1, Column 6, lines 53-56) teaches **two** sets of layers: ‘(a) a plurality of graphite fibre layers, and (b) a plurality of corrugated metal foils’. Calfee does **not** teach three groups of at least five separate layers with fully separate functions.

In addition, and as correctly pointed out by the Examiner, Calfee does not teach the presence of a polymer matrix.

To equate the prior art of Calfee and the Applicant's invention, which is a combination of **five** different elements that form a ‘force equilibrium’ (see *Drawings*), whereby incoming force is dissipated throughout the laminate structure's at least five layers immersed in resin, whereby each of the layers, including the resin, plays a distinctive function and role, would be a mistake. In isolation, or structured in a different

order within a laminate, none of the layers would produce the outcome they are designed to produce in the Applicant's structure, as explained in this paper.

The Examiner is asserting equation of the metal layers (14) in Calfee with a 'dissipating element' (1) in the present invention. The dissipating elements used in the composite laminate of the Applicant's invention form a net of triangular/multiangular force equilibriums and act in a way to redirect outer force/loading from transversal to longitudinal components in the structure.

Dissipating elements used in the Applicant's structures (expanded structures, meshes, etc) actually form a matrix mesh that interacts with dissipating element by creating a large number of force equilibriums (triangle, prismatic form) that disperse active loading in the longitudinal direction of the fibre reinforcement as well as reduce specific loading per area and increase structural strength, bending, impact and fatigue resistance.

Neither of the two types - (a) or (b) - of Calfee's '*plurality of layers*' are designed to perform these functions.

Calfee's structure clearly has a '*reverse impact side*' (*Column 3, lines 8-10*). The present invention has two *equal 'faces'* (two outer layers) whereby each one has a **full and equal capacity** to receive impact, and the internal parts of the structure perform their respective role regardless of which side of the structure is being loaded with impact. This is a significant difference to **all cited prior arts**.

It is also important to note that Calfee teaches that it is the glass fiber layer(s) (12) which provide a mechanism by which the energy of the impact can be *dissipated* (see column 3, lines 43-53 of Calfee). The present invention's first (outer) layer and second

(inner) ply are **not** primarily provided to dissipate energy. The dissipation of any incoming loading / impact energy is the primary function of the *dissipating element*. The ‘outer layers’ improve *impact resistance* and the ‘inner plies’ are *reinforcing* plies – as explained comprehensively in this paper.

The primary object of Calfee’s invention is to provide a laminate which is not only resistant to impacts, but has a high interlaminar shear strength (lines 64-67, column 1). This is achieved through the use of a plurality of corrugated metal foil layers thus preventing or significantly diminishing interlaminar shear. Therefore, clearly, Calfee, in addition to the admitted difference (no matrix, see bottom of page 10 of the Office Action), solves a different problem to that addressed by the Applicant.

Another key distinction from the previously argued points relates to Calfee’s lack of ‘polymer matrix’. The polymer matrix is, however, present in Hollis. By combining the two cited references, the Examiner rejected the present invention.

However, it is submitted that this has been done in error as, in summary: Calfee proposes a structure where the separate layers **do not** play the same function as in the Applicant’s invention (as explained in this paper and referred here). Therefore, even if the two prior arts were ‘combined’, they could **not** result in the present invention being *obvious*.

It is submitted that the present invention is not a “predictable use of prior art elements according to their established functions” (KSR Opinion, page 13) and the Examiner’s claimed combination of Bjorksten, Cook, Hollis and Calfee does not result in obviousness of the present invention. Without the established obviousness,

the *anticipation* cannot be satisfied. It is therefore respectfully submitted that the present invention is patentable in light of the cited prior art.

Given that the Applicant believes that the objections to the Claim 61 have been fully responded to in light of any and all prior art, any objections to dependant claims 62-73 in light of the cited prior art are now considered to be responded to, because claims 62-73 are fully dependant on to the main Claim 61, which is the essence of the present invention.

**OFFICE ACTION DATED 12 NOVEMBER 2008 – NEAL (US
6,703,104 B1)**

These REMARKS are submitted in response to Office Action dated 12 November 2008, where Neal is cited as prior art reference.

PLEASE NOTE that the Applicant **had responded** with an amendment to his Claim 61, resulting in a limitation of the claimed invention by stating that ‘*a polymer matrix [is] absent between sections of said outer layers and said at least two inner plies*’. Claim 61 has now been amended to delete this negative limitation, which was rejected by the Examiner in the latest Office Action, page 3: “Any claim containing negative limitation which does not have basis in the original disclosure should be rejected under 35 USC 112, first clause, as failing to comply with the written disclosure requirement.” Please respectfully acknowledge that Claim 61 has now been amended as presented in this paper, clarifying that the previous amendment is being reversed in this paper to teach

polymer matrix to fill all the space not taken by the inner plies and the dissipating element, as placed between the two outer layers.

This deletion of the ‘negative limitation’ from Claim 61 now reintroduces the need to address the Examiner’s objections in light of NEAL from her Office Action dated 12 November 2008. In response to the Neal objections, the following is submitted as being underpinned by the extensive explanation presented in this paper:

- ⊖ Neal fails to *disclose* or *render obvious* a **dissipating element** ‘*adapted to dissipate and redirect randomly directed local loading to at least one of the said two outer layers, to tensile loading directed in a longitudinal direction (tensile) of said at least two inner plies*’.
- ⊖ In his Claim 1, and Claims 21 and 33, Neal teaches a ‘composite armor’ comprising a ‘first layer comprising a plurality of closely packed geometric cells of a first material wherein a **major axis of the cells is normal** to the plane in which the first layer lies’. The Examiner equates these cells (105) with the Applicant’s ‘*dissipating element*’. In Column 7, line 29, Neal explains that the cells ‘have a length of about 0.750 inches, and a diameter of about 0.125 inches.’
- ⊖ The Applicant’s invention differs as his *dissipating element*’ does **not** comprise ‘*closely packed geometrical cells* that are placed **normal**’ to the main plane of the composite structure. The Applicant’s ‘*dissipating element*’ lays in between at least two inner plies and is placed in the longitudinal direction and parallel to the plane of the composite structure. It *dissipates* the

incoming impact energy and *redirects* it in the longitudinal direction of the inner reinforcement plies. To equate Neal's '0.750 inches long' geometrical cells placed under a '**normal**' angle to the structure's plane with expanded metal, or mesh metal, tubular, spherical and foam-like etc forms '**adapted to dissipate and redirect**' the incoming force (**F**) into 'internal dissipated forces (**Fi**)' - (see the *Drawings*) as taught in the Applicant's Claim 65, would be improper. It is important to understand that the Applicant teaches the ability to 'adapt' the dissipating element to achieve the 'force equilibrium' by dissipating and redirecting the impact in longitudinal direction of the inner plies. Neal's core cells **do not** achieve such dissipation and redirection of the incoming energy.

- ⌋ With careful analysis of the Neal invention, it becomes obvious that Neal's cells **do not** have the same function the 'dissipating element' has in the present invention.
- ⌋ In Column 7, lines 35-36, Neal differs again as he further explains that '*cells (105) provide strength and flexibility to the composite armor panels*'. 'Strength;' is in the Applicant's invention achieved through the *reinforcement plies*, and is not a function of the *dissipating element*.
- ⌋ Neal also differs as he does **not** teach a plurality of '*dissipating elements*' within the two outer layers as per the Applicant's Claim 62.
- ⌋ The Applicant refers the Examiner to all discussions on the specific placement / positioning, role and function of the *dissipating element* in the Applicant's

invention and all explanations discussed in this paper (above), as relevant for her consideration in respect of Neal.

The conclusion is that Neal does not teach the same structure as the present invention and as such forms no basis for a valid rejection. The rejection should be reversed.

CONCLUSION

In view of the arguments in this paper, the Applicant respectfully submits that **no reasonable combination** of cited references of Neal, Bjorksten, Cook, Hollis and Calfee would render obvious the features of the present invention, as no combination of these prior arts disclose all the features recited in the present invention.

NO FURTHER REMARKS ARE SUBMITTED

A petition for any and all extensions of time is hereby made. Please charge all fees due and owing to Deposit Account 500356 in the name of *A + Legal Services – Greenberg and Lieberman*.

Respectfully,

/mlg/

Michael L. Greenberg, Esq.

Reg. no. 47312